

Simulation: Tool For The Training Of Students Of Health Sciences

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ABSTRACT

Simulation in students of the health sciences is used with the aim of strengthening the theoretical knowledge they acquire. We know that, without a simulated practice for students of nursing, surgical instrumentation, medicine, physiotherapy, etc. These may present shortcomings when facing the labor field. That is why simulation is considered as a tool for the training of students of health sciences, so that they acquire skills, abilities and strengthen theoretical practical knowledge. Determine the teaching-learning relationship in simulation as a pedagogical tool for the training of students in health sciences. A bibliographic review was carried out obtaining information from indexed and gray databases, for example, Scielo, PubMed, Dialnet, Revista Hospital Clínico Universitario de Chile, Educ. MedSuper, Science, Technology and Innovation Magazine, Global Nursing, Social Prism. The information provided was organized in matrices for bibliographic characterization and as a bibliographic manager the application of Mendeley was necessary. Learning styles played an important role within the simulations where the student manages to generate strategies for independent study, implementing skills since each person learns in a different way, that is why they devise the way in which you can capture all that pertinent information that allows you to achieve good clinical practices in your in-hospital practices.



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1. INTRODUCTION

1.1 Psychological preparation and knowledge of the student regarding the simulation.

Technological development has caused since the industrial revolution, an exponential growth of risks both at the level of the environment and in human health is for this reason that accident controls have been increasing, according to the risks that technologies present. Thus, as highly responsible industries or High Reliability

Organizations, have developed the use of incident simulation to train personnel working in these industries, such is the case of nuclear plants, the aeronautical industry, etc., therefore, from the sixties, these activities began to be incorporated into medical practices; currently, clinical simulation is one of the most widely used activities in the training of health personnel [1].

Students of health sciences find themselves with great expectations when starting their simulated and hospital practices accompanied by different emotions and feelings because this is a challenge that each of the students must face to improve and put into practice each of their theoretical knowledge. The Central University of Chile- La Serena headquarters carried out a daily content analysis prepared by the future colleagues of the first practice sessions in the field where it was concluded that health students experience fears, misgivings, desires, prejudices, criticisms, desires to learn, where they managed to conclude that the emotional aspect plays an important role in the time of carrying out their practices since depending on the emotions and feelings that they present are also linked to their way of developing in it [2].

It is clear that students have demonstrated deficiencies in their practical and theoretical skills, which have not allowed them to absorb the highest percentage of information taught in the classroom, in the midst of so many shortcomings that were found in students in the health area when they carried out their practices, various strategies were created to improve each of the disadvantages that were found in these students; the use of mannequins and cadavers for training in cardiopulmonary resuscitation is implemented, also where physiological and anatomical functions can be studied [3]. It is important to know that there are students who need a practical complement to be able to acquire knowledge, for this Kolb characterized four learning styles, such as usher, assimilator, convergent and divergent [4].

The implementation of a simulation program does not require so many expenses for the acquisition of high-tech simulators, since there are a number of tools and strategies with resources at hand to make it possible for this education methodology to be carried out satisfactorily in educational institutions, since these indicate that the promotion of activities focused on simulation generates great comfort and skill to students [3].

1.2 Nursing simulation

In the area of nursing has long been using this type of simulators, this is done in order for students to generate a wide knowledge, skills and their learning in these practices is very efficient. In this type of simulated practices, students have learned to carry out a physical examination, place catheters, take the temperature, administer drugs, place injections, heal wounds and change bandages, etc. This type of practice helps them so that in the future they do not comment on mistakes with the patient, but that they already go with their skills and abilities well developed [5].

1.3 Simulation of surgical instrumentation

In surgical instrumentation, even more of these simulated practices are needed, since, they are in charge of the assembly of the surgery, surgical clothing of the patient and surgeons, they are the main support of the surgeon, therefore, they must have an extensive knowledge in anatomy and instruments, to be able to help the surgeon in a good way. Simulators make learning much easier, so when it comes to going to surgical scenarios they already have a lot of knowledge and skills in this [6].

1.4 Simulation in medicine

The use of simulation in medical education has unleashed multiple advantages, this has become an ideal training to face new challenges, helping the student to shorten their learning time, skills and abilities, especially because they can redo the activities as many times as necessary, allowing practical experiences in

different types of environments from the simplest to the most complex, on the other hand, this method of rapid medical learning is based on taking the student to the last consequences in a safe environment where errors are allowed and no harm is generated to patients, so not only generates security to the student but also the integrity and safety of the patient, these trainings have as their central objectives to shorten the percentages of clinical failures, coordination failures in professional teams and irreversible damage in patients [7].

This work aims to describe how simulation is a tool capable of generating new knowledge from practice as a consolidation of theory in students of health sciences, in addition, it aims to determine the teaching-learning relationship in simulation as a pedagogical tool for the training of students of health sciences.

2. Methodology

A bibliographic review was carried out obtaining information from indexed and gray databases, for example, Scielo, PubMed, Dialnet, Revista Hospital Clínico Universitario de Chile, Educ. MedSuper, Science, Technology and Innovation Magazine, Global Nursing, Social Prism. The information provided was organized in matrices for bibliographic characterization and as a bibliographic manager the application of Mendeley was necessary.

2.1 Patient safety through simulation.

simulated education is a training method for students, since it facilitates them to develop something very important, in the field of health, which is safety, both for the student and for the patient, this helps us not to expose the patient and he does not have any risk. this method helps us prevent mistakes and allows students to have more confidence about themselves [8].

At the international level, the medical journal of Mexico has studies carried out to ensure patient safety through simulation with biological model so that medical students strengthen their methodologies and practices in thoracic surgery, since thus learning to work under stress and pressure in the face of adverse situations in the clinic, therefore, in these studies it shows that they performed two simulation scenarios with heterogeneous groups of residents from the first to fourth year of thoracic surgery, for which 84 clinically healthy Landrace pigs were used. The first scenario is the procurement of the heart-lung block and the preparation of the graft for transplantation of the left lung and the second scenario is the realization of the left lung transplant. These studies are conducted to improve teaching and prevent errors in medicine. The scenarios were very useful to put into practice the two surgical techniques described, helped them improve their surgical performance, consecutively improved their manual and technical skills. All agreed to continue performing the simulation with a living biological model [9].

2.2 The use of medical simulation as a tool for clinical practice.

The article Teoría la Educ Educ and Cult en la Soc la Inf. From Barcelona, it is proposed to change the care model for the training of each of the future professionals in the area of health, in this way to ensure the safety and privacy of each patient, for this reason simulation is the fundamental tool to create skills and face the new challenges that arise in education. Likewise, the article ev Cuba Educ Medica Súper supports aspects of teaching and learning according to Klineberg which is based on the link between theory and practice as an optimal learning method, where the student puts into practice everything learned in the classroom, thus allowing him to have greater clarity and learn more effectively, it also builds confidence in the student when faced with their internships [10], [11].

2.3 High-tech, low-cost simulation.

At the national level, the journal of the Faculty of Health UDES in Bucaramanga, proposes a study for the

use of the simulated patient, a clinical simulator of low cost and low technology, but of high fidelity, In addition to being able to be used with minimum economic resources offers an improvement with respect to the proximity with the patient because the human factor is immersed in said learning process Since they in the middle of their studies found that simulators are high cost and are very difficult to obtain in institutions, for this in their study they intervened in low-tech and high-fidelity clinical simulation by conducting a course taught with students and in which they designed clinical cases according to the previous knowledge that each student had, therefore they carried out the design of the clinical simulation, where they looked for the corresponding materials and the students who would serve as simulated patients, they were provided with information-training on the clinical case to be played, what corresponds to the procedure and their role as simulated patients then they performed 2 tests where they placed a group to make a checklist with the entire procedure using the simulation in the clinical case and another group that performed the checklist without using the clinical simulator, therefore, it was evidenced that there were deficiencies in the realization of the checklist in the second group for not implementing the simulation [12].

2.4 Simulation in surgery and emotional state of students

The journal Cir Cir conducted a study called Simulation in surgery, where are we and where will we go? This study speaks of the emotional importance it can cause in the student explaining how simulation, above all, provides a unique opportunity to practice psychomotor skills, as well as auxiliary tasks of some complete processes and procedures. The laboratory environment and simulation modalities allow the student to learn from the errors and adverse events that can occur forming a safe environment, while in the clinic harm can be caused to patients. They also talk about the types of simulators and the benefits they bring. Virtual simulation is useful in imaging procedures performed in vascular surgery, especially in endoluminal surgery. The augmented reality simulator is the combination of virtual reality and physical reality in one system. The main advantage of augmented reality over virtual reality is that it allows the student to use the same instruments that are going to be used in a specific procedure. Human simulators, used specifically for training in resuscitation, resuscitation, trauma and anesthesiology. Fresh human cadavers frozen or specially preserved offer a unique opportunity for training in imaging procedures or open surgery [13].

2.5 Using simulation in interprofessional education

Simulation is the artificial representation of a complex real-world process with sufficient fidelity with the aim of facilitating learning through immersion, reflection, feedback, and practice without the risks inherent in a similar real-life experience. The simulation offers us various strategies by virtue of the students, for a better practical training, all this is thanks to the high technology that favors us a better learning, apart from being something that favors the student a lot in his professional life [14]. In today's increasingly complex and ever-changing healthcare system, where the medical knowledge base doubles in ever-shorter time intervals, the role of the physician has been transformed from the sole physician overseeing all aspects of a patient's care to the leader of a group of health professionals. each of whom contributes their expertise in their field of practice to help patients on their path to health. This situation is especially true for surgeons who, thanks to advances in intensive care, surgical equipment and techniques, pharmacology, anesthesia, and physical and occupational therapy, now care more like a collaborative team coach than an autonomous captain of a ship. These requirements are changing, as they are necessary for health care that is constantly evolving. This has led national organizations to recognize that health personnel must be trained prior to working in the workplace. Since then, the need to apply simulation for the different areas of health has increased [15].

2.6 Simulated strategies that reduce errors in clinical practice

The use of simulation is increasingly necessary and implemented in educational institutions, however, its use remains limited, because it is considered that the implementation of this is expensive, demanding in terms of

infrastructure and time [16]. The simulation provides a unique opportunity for health professionals, as it allows them to have training in a safe environment, to freely discuss problems and errors with other health professionals, away from patients and their families. This strategy also allows to practice rare clinical situations, insecure, delicate management and procedures of high complexity. The strategy of clinical simulation has a lot to offer in this regard, from error management, teamwork, improving performance in complex systems and, above all, promoting the culture of patient safety [17]. On the other hand, the limitations of this methodology are related to the feasibility of this according to the availability of human and economic resources. Institutions must train their teaching staff since many do not have a close relationship associated with the use of these tools, which requires the redesign of the programmatic content focused on the objectives that are intended to be obtained according to the academic level of the students [18].

2.7 Types of simulator that contribute to the learning of health students.

The medical simulation will help those who practice it to obtain a good psychomotor capacity, technical and cognitive skills for their professional development. There are different activities where we can find the different learning processes where a student can perform for the use of a simulator. [See Table 1]

Table 1 Types of Simulators and advantages

SIMULATORS	KNOWLEDGE
MANNEQUINS	This type of simulator allows the student to have a more accurate knowledge about the human body and the parts that compose it. Its pathophysiology and anatomy [19].
OPERATING ROOM SIMULATORS	This type of simulator allows the student to represent clinical scenarios, a development of confidence in them, improves good teamwork and improves communication with patients [19].
ON-SCREEN VIRTUAL SIMULATORS	They are computer programs that allow to simulate various situations, in areas such as physiology, pharmacology or clinical problems, and interact with the student or students [19].

The stages of learning lead students to acquire expected skills or competencies, a simulation session is characterized by the presence of four central components. The first component is called exposure, which consists of the introduction of learners to the problem ahead, and is also known as information. The second element is sequencing, defined by a progressively increasing complexity during the session, which helps learners to build on consolidated knowledge and allows them to perform better throughout the exercise. The third basic component is called feedback, and it refers to the continuous exchange of information between the trainer and the learner. This process takes place during and/or after the simulation session, and the instructor should be observant of the learners' skills and performance to guide the learning process. Finally, the last component is repetition, which provides better retention of the knowledge learned during a session [20].

Clinical simulation is a process involving the creation of a hypothetical situation that incorporates an authentic representation of reality, facilitating student participation and integrating the complexities of practical and theoretical learning with opportunities for repetition, feedback, evaluation and reflection, without the risk of causing harm to the patient. Over the years we have seen an important technological evolution that has managed to have a positive impact on the creation of new anatomical models that are increasingly sophisticated and with technologies that manage to reproduce vital functions of the human being and develop complex clinical scenarios. This technological advance has allowed nursing schools to create new clinical scenarios very similar to those of real practice in a controlled environment where they can repeat the

procedures and scenarios as many times as necessary until the student manages to do it correctly, as well as learn from the error without causing harm, which could not happen in real practice. Simulation-based medical education is superior to traditional clinical teaching for the learning of attitudes and skills and that training through simulation is associated with better learning in skills and behaviors, but at the present time it has moderate effects on patient outcomes [21], [22].

2.8 A systems analysis of an outpatient clinic of the university health service

A Monte Carlo simulation model showed the effects of alternative decision rules for scheduling appointment periods during the day to increase patient performance and physician utilization. It also presents a case study on the use of mathematical-computer models in the development of operational policies for an outpatient clinic of the university health service [23].

2.9 The implementation of a virtual reality simulation clinic

An immersive virtual reality [VR] simulation clinic with dynamic interaction and communication with the patient was conducted to facilitate the training of medical radiation science students. An iterative approach to development, based on two cycles of user feedback, was used to develop and refine the simulated clinical environment. This environment uses realistic 3D models, integrated clinical scenarios, dynamic communication, 3D manual gesture interaction, positional stereoscopic tracking [24].

2.10 Simulation avoids adverse events.

One of the advantages of simulating predictable, consistent, standardized, safe and reproducible scenarios is the possibility that students present errors that can be corrected by repeating the procedure correctly reinforcing knowledge through these educational tools [25]. Many times, students who have not had this simulated learning process can make many mistakes when facing situations of tension and a lot of stress, which is produced by poor communication between patients and the suffocation of all the activities that the student must perform on the day of their hospital practices. That is why there are several studies on a comparison of students who had a training process in simulation and others who did not have a training process, and these were the results. [See Table 2]

Table 2. Training process with simulators

STUDENTS WHO DID NOT HAVE A TRAINING PROCESS IN SIMULATION.	STUDENTS WHO DID HAVE A TRAINING PROCESS IN SIMULATION.
The students had high stress levels and previous experience in their hospital practice SCENARIOS [26].	The students had a low level of stress and were able to perform well in their hospital practices [26].

2.11 Simulation and training in minimally invasive surgery in Urology

Changes in the delivery of surgical services, reduced training times and growing awareness of patient safety have had a profound effect on surgical training. Urology is a technology-driven specialty, in which the impact of these changes is potentially critical. Surgical training has traditionally been based on direct patient care, but the trend is changing. Simulation is increasingly incorporating this specialty into the training programs, since as more minimally invasive urological techniques are introduced, strategic opportunities are created in these simulation centers for teaching and training [27].

2.12 Skills acquired in simulation

Simulation is a dynamic process that involves the creation of a hypothetical opportunity that incorporates an

authentic representation of reality, facilitates student engagement, and integrates the complexities of practical and theoretical learning with the opportunity for repetition, feedback, evaluation, and reflection [28].

The simulation as a technique or model of educational study has generated different competences, including attitudes, knowledge and skills, on the other hand, the student develops competences of two types such as generic competences [developed without help] and specific competences developed professionally, within them, are the cognitive skills where the student develops theoretical knowledge and education, acquires a better management of information by applying better knowledge to real situations and using learning resources to have a better experience. Technical skills are put into practice in some kind of procedure [29]. Interrogative skills are the ones that apply judgment, rationing and clinical knowledge to the management of doubts. Conceptual skills are those that manage time in clinical scenarios. Relationship skills, these help the student to manage conflicts and work teams. Moral skills are developed for the psychological state of the student, for example, the management of emotions and feelings. And finally, the habits of thoughts, which are of great help for the recognition of errors and attitudes, that is, to be a person of integrity in different situations [29].

2.13 Importance of simulation in health sciences and robotic surgery.

Simulation and robotic surgery have great features in common, both have an interface that provides information about a patient, use visualization monitors in procedures and also use different support applications for the interaction of students and health professionals, that is, this tool is not only used by students but also professionals allowing them to have a better technique or skill when performing procedures. such as minimally invasive [30].

3. Conclusion

Due to the promotion in the use of clinical simulators in universities and the implementation of digital anatomy programs, such as: mannequins for training for Cardiopulmonary Resuscitation [CPR], also where to study and reinforce physiological functions of the human body, fulfilling the objectives of satisfactory learning. It is important to note that students without the use of these strategies manifested deficiencies and difficulties when carrying out their clinical practices. However, once the simulation is implemented, a great improvement is evident, being able to notice the positive impact that it generates.

The sensations generated by this learning process in students bring with them feelings of fear, anguish and distrust, important factors to consider for managing emotions and exploring new learning strategies. Undoubtedly, being able to generate trust with each student in the clinical-educational field is the main objective, and when carrying out their hospital rotations they can develop insurance of each of the knowledge they acquired throughout their educational time in universities.

Learning styles played an important role within the simulations where the student manages to generate strategies for independent study, implementing skills since each person learns in a different way, that is why they devise the way in which you can capture all that pertinent information that allows you to achieve good clinical practices in your in-hospital practices.

For this reason, we can reaffirm that the use of strategies implemented in educational institutions for learning in students of health sciences brings with its favorable results in the capture of information and the development of new knowledge. Focused on good hospital practice, it is evident in the study of this work that students feel more comfortable, safe and with the appropriate basic knowledge to face a hospital field.

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4. References

- [1] Block Yr. Integrated procedural training with a full focus on clinical simulation. *Arch Venez Farmacol Ter.* 2018;38[2]:6-11.
- [2] Gonzalez CAG. Emotions and Feelings on the First Day of Practice: My First Practical Contact with Physical Education. *Rev Mot Pers Ser Estud.* 2012; [11]:39-48.
- [3] Serna Corredor DS, Martínez-Sánchez L. Simulation in medical education, an alternative to facilitate learning. *Arch Med Manizales.* November 19, 2018;18.
- [4] Guzman B, Castro S. Learning styles in teaching and learning: A proposal for its implementation. *Rev Investig ISSN 1010-2914 No. 58 2005.* January 1, 2005;58.
- [5] Simulation as a methodology for learning non-technical skills in Nursing. [Internet]. [cited 27 February 2022]. Available in: <https://1library.co/document/y9dxlpdq-simulacion-metodologia-aprendizaje-habilidades-tecnicas-enfermeria.html>
- [6] CuadernosEducacionSalud_2021_SimulacionEstrategiaDidactica.pdf [Internet]. [cited 27 February 2022]. Available in: http://repositorio.udea.edu.co/bitstream/10495/26101/4/CuadernosEducacionSalud_2021_SimulacionEstrategiaDidactica.pdf
- [7] Argullós JLP, Sancho CG. The use of simulations in medical education. *Educ Knowl Soc EKS.* June 15, 2010;11[2]:147-70.
- [8] Simulation in Clinical Nursing Education [Internet]. [cited 12 March 2022]. Available in: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8116070/>
- [9] Vázquez-Minero J, Olmos-Zuñiga JR, Guzman E, Iñiguez-Garcia M, Santillan-Doherty P, Chávez-Tinoco A, et al. Simulation with biological model, as a tool in the teaching-learning process of the Thoracic Surgery residency in Mexico. *NCT Neumol Cir Thorax.* January 1, 2019;78:20-4.
- [10] Lus de les simulacions en educacio medica.pdf [Internet]. [cited 27 February 2022]. Available in: http://www.ub.edu/medicina_unitateducaciomedica/documentos/Lus%20de%20les%20simulacions%20en%20educacio%20medica.pdf
- [11] Medina González I, Tafur Castillo J of the S. Didactics of Nursing, analysis from its components in the current context. *Educ Médica Super.* December 2018;32[4]:263-72.
- [12] Felipe LM, Velázquez MSG. Use of the clinical simulator for learning procedural content in nursing. *Rev Fac Cienc Health UDES.* January 15, 2017;4[1]:31-8.
- [13] Jakimowicz J, Jakimowicz C, Jackimowicz J. Simulation in surgery, where are we and where will we

arrive? 1 January 2011;

[14] Datta R, Upadhyay K, Jaideep C. Simulation and its role in medical education. *Med J Armed Forces India*. April 2012;68[2]:167-72.

[15] Simulation in Surgical Training and Practice, An Issue of Surgical Clinics - Kimberly M. Brown, MD, FACS - Google Books [Internet]. [cited 27 February 2022]. Available in: <https://books.google.com.co/books?hl=es&lr=&id=-IGIGcAAQBAJ&oi=fnd&pg=PP1&dq=clinic+AND+simulation+AND+universities+AND+health&ots=3Yo2RIQ1hd&sig=P7tID3EOOrDzZW5Up3Q-QiSg7pyc#v=onepage&q=clinic%20AND%20simulation%20AND%20universities%20AND%20health&f=false>

[16] Gomar-Sancho C, Palés-Argullós J. Why is simulation in the teaching of health sciences still underused? *Medical Education*. June 2011;14[2]:101-3.

[17] Gutiérrez LH, Núñez AVB, Cárdenas CD, Cortés HEO, Gabriela A, Sánchez O, et al. Patient safety and clinical simulation. :10.

[18] Riancho J, Maestre JM, Moral I del, Riancho JA. High realism clinical simulation: an experience in the undergraduate. *Medical Education*. June 2012;15[2]:109-15.

[19] Santalucia P, Zaninelli A, Ragazzoni L, Gensini GF, SIMMED. SIMMED SIMulation in MEDicine, Italian Society for simulation in medicine position paper: executive summary. *Intern Emerg Med*. June 2016;11[4]:537-44.

[20] Jones F, Passos-Neto CE, Braghiroli OFM. Simulation in Medical Education: Brief history and methodology. *Princ Pract Clin Res* [Internet]. 16 September 2015 [cited 27 February 2022];1[2]. Available in: <https://journal.ppcr.org/index.php/ppcrjournal/article/view/12>

[21] Sánchez ML, López LR, López OP, Álvarez SL. Clinical simulation as a learning tool Simulation based-training in Medicine: a teaching tool. . Vol. 18:6.

[22] Quirós SM, Vargas MA de O. Clinical Simulation: a strategy that articulates teaching and research practices in nursing. *Text Context - Enferm*. December 2014;23[4]:815-6.

[23] A Systems Analysis of a University-Health-Service Outpatient Clinic [Internet]. [cited 27 February 2022]. Available in: <https://ideas.repec.org/a/inm/oropre/v21y1973i5p1030-1047.html>

[24] Sapkaroski D, Baird M, McInerney J, Dimmock MR. The implementation of a haptic feedback virtual reality simulation clinic with dynamic patient interaction and communication for medical imaging students. *J Med Radiat Sci*. September 2018;65[3]:218-25.

[25] Clinical simulation and its usefulness in improving patient safety [Internet]. [cited 27 February 2022]. Available in: <https://repositorio.unican.es/xmlui/handle/10902/901>

[26] Simulation in Medical Education: A Synopsis [Internet]. [cited 27 February 2022]. Available in:

https://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0034-98872013000100010

[27] Patel HRH, Joseph JV. Simulation Training in Laparoscopy and Robotic Surgery. Springer Science & Business Media; 2012. 115 p.

[28] Student and educator experiences of maternal-child simulatio... : JBI Evidence Synthesis [Internet]. [cited 12 March 2022]. Available in: https://journals.lww.com/jbisrir/Fulltext/2015/13010/Student_and_educator_experiences_of_maternal_child.3.aspx

[29] Casal Angulo M del C. Simulation as a methodology for learning non-technical skills in Nursing. 2016 [cited 27 February 2022]; Available in: <https://roderic.uv.es/handle/10550/54430>

[30] Kunkler K. The role of medical simulation: an overview. *Int J Med Robot.* 2006;2[3]:203-10.